



The Tesla Factory
in the Innovation
District of
Fremont



FY 2018 BUILD Transportation Discretionary Grants

Fremont Innovation District Traffic Signal Modernization Project

www.fremont.gov/FID-BUILD-Application



The City of Fremont aims to build a **modern traffic signal system** for the **safe and efficient movement of people and goods** in Fremont's Innovation District, to support America's economic competitiveness, innovation leadership, and **development of great communities** and to showcase **shared investments** from public-private partnerships.

July 2018

New Developments in Fremont's Innovation District



Tesla Motors Factory expansion from 5 million to 9.6 million square feet and supporting 10,000 jobs. One of America's largest manufacturing facilities west of the Mississippi River.



New residential communities with 4000 housing units, parks, a new elementary school, and neighborhood retail services.



New office, research and development, advanced manufacturing, and warehousing space totaling 4.2 million square feet.



New hotels with 300 rooms and 53,000 square feet of meeting space for conventions

CITY OF FREMONT BUILD GRANT APPLICATION

CONTENTS

1. Letter from City of Fremont Mayor Lily Mei	1
2. Program/Project Description	2
About the City of Fremont	2
Fremont Innovation District	3
Fremont Innovation District Mobility Program	6
Fremont Innovation District Traffic Signal Modernization Project	9
3. Project Location	11
4. Grant Funds, Sources, and Use of Project Funds	13
5. Merit Criteria.....	14
a. Economic Competitiveness	14
b. Safety	17
c. Innovation	19
I. Innovative Technologies	19
II. Innovative Financing	21
d. Partnership	21
e. Environmental Protection	23
f. Quality of Life.....	23
g. State of Good Repair.....	25
h. Non-Federal Revenue for Transportation Infrastructure	25
6. Project Readiness	25
Technical Feasibility.....	25
Project Schedule	26
Required Approvals	27

APPENDIX A: BENEFIT COST ANALYSIS MEMORANDUM

APPENDIX B: BENEFIT COST ANALYSIS SPREADSHEETS

APPENDIX C: DETAILED COST ESTIMATES

APPENDIX D: SUPPORT LETTERS FOR GRANT APPLICATION ACCESSIBLE AT:

www.fremont.gov/FID-BUILD-Application

CITY OF FREMONT BUILD GRANT APPLICATION

List of Acronyms

Alameda CTC	Alameda County Transportation Commission
BART	Bay Area Rapid Transit
B/C	Benefit-Cost
BCA	Benefit-Cost Analysis
BUILD	Better Utilizing Investment to Leverage Development program
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CIP	Capital Improvement Program
CPI-U	Consumer Price Index for Urban Consumers
CMF	Crash Modification Factor
DSRC	Dedicated Short-Range Communications
EVP	Emergency Vehicle Preemption
FHWA	Federal Highway Administration
FID	Fremont Innovation District
ITS	Intelligent Transportation Systems
MTC	Metropolitan Transportation Commission
NEPA	National Environmental Policy Act
NPV	Net Present Value
O&M	Operations and Maintenance
PCI	Pavement Condition Index
PE	Preliminary Engineering
PG&E	Pacific Gas and Electric Company
PS&E	Plans, Specifications and Estimates
P3/PPP	Public-private partnerships
R&D	Research and Development
RTP	Regional Transportation Plan
SPaT	Signal Phasing and Timing
TMC	Traffic Management Center
TIP	Transportation Improvement Plan
TRB	Transportation Research Board
USBLS	U.S. Bureau of Labor Statistics
USDOT	United States Department of Transportation
VHT	Vehicle Hours Traveled
VOT	Value of time
V2I	Vehicle-to-Infrastructure

July 16, 2018

The Honorable Elaine L. Chao
Secretary
United States Department of Transportation
1200 New Jersey Avenue, S.E.
Washington, DC 20590



Dear Secretary Chao:

Thank you so much for considering my city's opportunity to partner with the United States Department of Transportation (USDOT) as part of the Better Utilizing Investment to Leverage Development (BUILD) program. We are proposing a \$6.4 million federal investment to showcase the deployment of advanced traffic signal systems and to support the continued economic development of Fremont's Innovation District.

The Fremont Innovation District is a leading hub for advanced manufacturing in Silicon Valley and America, and is home to the rapidly growing Tesla Motors factory, as well as other innovation companies such as Lam Research, Delta Products, Seagate, Western Digital, and ThermoFisher. Fremont has also planned for building a complete community within the Innovation District to complement job growth with new places for families to live, a new school for children, and parks for play and recreation.

Thanks to the help of our nation's strong economy and support for American manufacturing, the Fremont Innovation District is booming with development activity. Private development approvals have been granted for over nine (9) million square feet of space to support new jobs and for 4,000 new housing units for people to live nearby. Our development partners include Tesla Motors, Conor, Overton Moore Properties, Sobrato, Lennar, Toll Brothers, Valley Oak, and Marriott. Of course, transportation investment is also needed to enhance mobility for people and goods traveling to, from and within the Fremont Innovation District.

I'm pleased that our regional highway and transit systems are being improved to serve the area. A further transportation investment for which we are seeking to partner with USDOT on is the deployment of a modernized traffic signal system for the 37 signals in Fremont Innovation District. New technologies are now available to optimize the efficiency and safety of travel as part of a mobility network based on sensors and communication between signals, people, and vehicles. Fremont already has \$10 million in local funding to build an advanced traffic signal system in the central part of our City. We are proposing to leverage this investment to expand the system into our Innovation District with funding from the BUILD program.

We believe this investment can reap significant national benefits to not only be a showcase for transportation innovation, but to also support the continued vibrancy of the Fremont Innovation District as a great American community in which people can live and work. Let's work together to "build" it!

Sincerely,



Lily Mei
Mayor



CITY OF FREMONT BUILD GRANT APPLICATION

2. PROGRAM/PROJECT DESCRIPTION

The **Fremont Innovation District Traffic Signal Modernization Project** will improve the mobility and safety of people and goods traveling to, from, and within Fremont's Innovation District by deploying advanced traffic signal technologies and strategies. The **Fremont Innovation District** is a booming, 850-acre economic development zone plan anchored by Tesla Motors' factory and significant new commercial and residential development. The FID Traffic Signal Modernization Project forms an integral component of the **Fremont Innovation District (FID) Mobility Program** includes local and regional transportation infrastructure investments to enhance goods movement, travel efficiency, and safety for all modes of travel as well as to support increased economic competitiveness for a globally significant hub of manufacturing and innovation.

ABOUT THE CITY OF FREMONT

The City of Fremont is a mid-sized suburban community with a population of 231,664, situated within the San Francisco-Oakland-Hayward Metropolitan Area¹. **Figure 1** shows City of Fremont's location in relation to the rest of the United States.

Fremont is part of the Silicon Valley ecosystem and is a global leader for innovation and a national hub for economic growth. The City of Fremont has 40 million square feet of industrial space and **makes up 63% of all Research and Development (R&D) inventory** in the eastern part of the San Francisco Bay Area². Modern advances in mobility are now being innovated in the Fremont area, with the world's most advanced electric vehicles being made by Tesla Motors in their Fremont factory. Nearby, other companies like Google, Uber, and Lyft are helping to invent the future of mobility. Almost all the global automotive companies such as Ford, Toyota and BMW have R&D centers in the Silicon Valley.



Figure 1: Location of the City of Fremont within the US

As a regional technology and manufacturing hub, the **City of Fremont has received over \$1 Billion of venture capital funding** in recent years¹.

¹ American Community Survey (ACS), 2017

CITY OF FREMONT BUILD GRANT APPLICATION



Figure 2: Freight Traffic Moving Tesla Vehicles

FREMONT INNOVATION DISTRICT

The **Fremont Innovation District (FID)** is an economic development district located southwestern part of the city. The FID is situated at the nexus of Silicon Valley's innovation economy and supports job creation and product development by providing space for advanced manufacturing, warehousing and logistics, and research and development. The FID has the geographic advantage of proximity to I-880 and I-680, which are National Primary Freight Network Routes designated by the Federal Highway Administration (FHWA). The FID is currently experiencing a significant wave of commercial and residential development, including a cluster of advanced industries and a brand new residential community supporting this employment hub, as shown on **Figure 4**.



Figure 3: Renderings of the Fremont Innovation District

CITY OF FREMONT BUILD GRANT APPLICATION

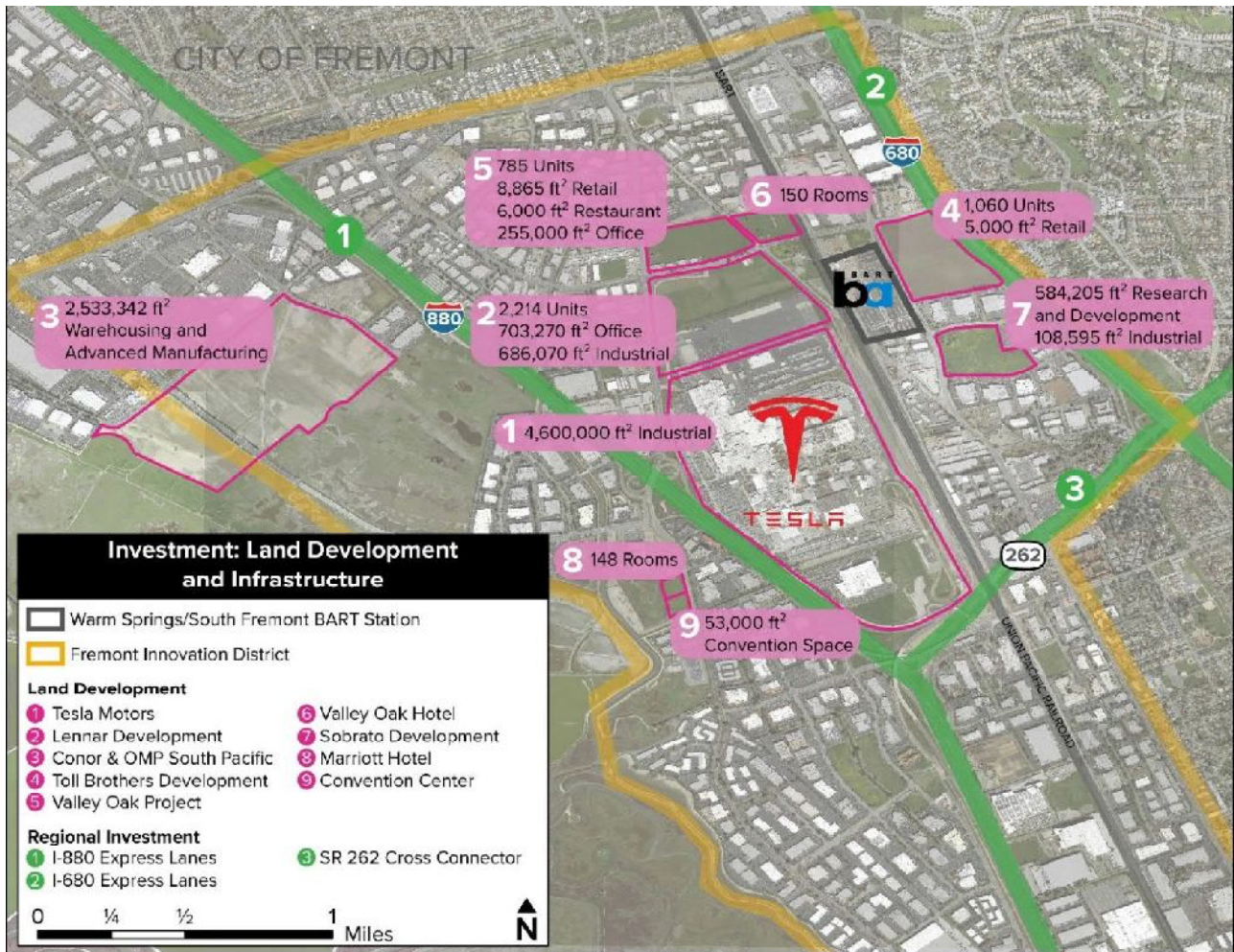


Figure 4: Map of Fremont Innovation District's Planned Development

The FID will eventually be the site of 40,000 jobs, when approved developments all come online. Companies that currently reside within the FID are **industry drivers in innovation** such as **Tesla Motors, Lam Research, Delta Products, Seagate, Western Digital, ThermoFisher**, and several startups in clean technology, life sciences, and advanced manufacturing as shown in **Figure 5**.



Figure 5: Research and Development Centers within the FID

CITY OF FREMONT BUILD GRANT APPLICATION

Figure 6 shows an aerial view of the existing Tesla manufacturing center in Fremont which has been approved to expand to up to twice its current footprint.



Figure 6: Aerial View of the Tesla Manufacturing Facility in the City of Fremont Approved to Expand up to Twice the Current Footprint.

To address the ongoing expansion of existing tenants such as Tesla, and accommodate the housing needs for employees of future tenants of the planned office and industrial space in the FID, the FID Master Plan includes residential development projects such as the Lennar, Toll Brothers and Valley Oak development projects that provide housing for employees close to the workplace. The FID Master Plan also includes key amenities such as hotels and convention centers for industry events and corporate gatherings. Of all the residential, commercial and industrial development in the FID shown on **Figure 4**, many of these developments have broken ground and some are in advanced stages of construction as shown in **Figure 7** below.

Tesla, Inc. is the largest automobile manufacturer west of the Mississippi and is currently undergoing expansion of its Fremont facilities. In 2016, the City of Fremont approved Tesla's Master Plan for its expansion of 4.6 million square feet of facility space on 256.63 acres. **The expansion will increase Tesla's employment from 6,210 to 9,315 workers and allow them to produce 500,000 vehicles annually --increasing their annual production by 90% compared to 2015 levels.** Construction for the Tesla expansion is currently underway.



Figure 7: Lennar Residential Development under Construction Within the FID Looking West

CITY OF FREMONT BUILD GRANT APPLICATION

FREMONT INNOVATION DISTRICT MOBILITY PROGRAM

The City has initiated the **Fremont Innovation District Mobility Program** to enhance infrastructure connectivity and increase economic competitiveness. The Mobility Program comprises a set of local and regional transportation infrastructure investments to provide the following key benefits:

- **Strong economic benefits** from the development of the area into a cohesive community - with job hubs and residential elements that are connected by efficient transportation and transit networks.
- **Enhances safety for all modes** by reducing emergency vehicle response time, incidence of speeding and stopping by improving the overall flow and traffic through real time data environment.
- **Advances manufacturing in the United States** by providing research and development, office, and industrial space at the edge of Silicon Valley, headlined by **Tesla's motor vehicle factory**.
- **Lennar** and other land development projects surrounding the newly opened BART Warm Springs station **provide housing close to the employment base**.
- **Collaborative Public-Private Partnerships (P3)** are in place to help deliver the vision.

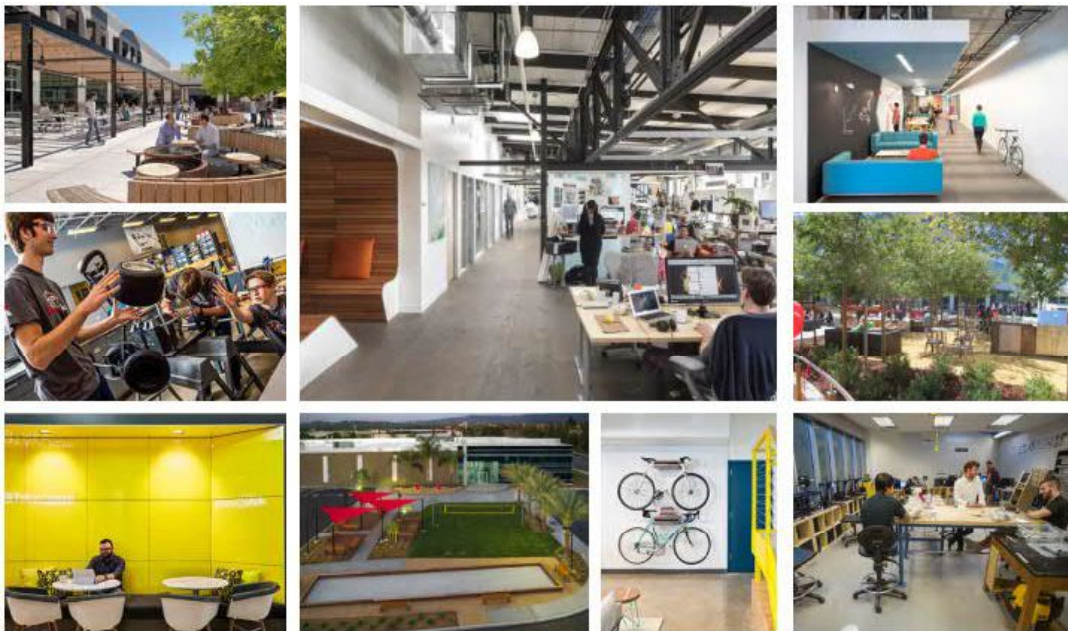


Figure 8: Efficient Buildings within the FID to encourage Economic Benefits, Enhance Safety, and Advance Manufacturing

- **Significant investments from federal, state, and local resources have been committed to transportation infrastructure in the FID.** In addition to public investment, the City of Fremont has received significant support from private partners such as land developers and major employers within the FID who see the economic value in improved efficiency in goods movement and services, reductions in travel time, and safety improvements.

CITY OF FREMONT BUILD GRANT APPLICATION

Many of the FID Mobility Program projects are fully funded and are either in operation or in advanced stages of project delivery as indicated in **Figure 9**.

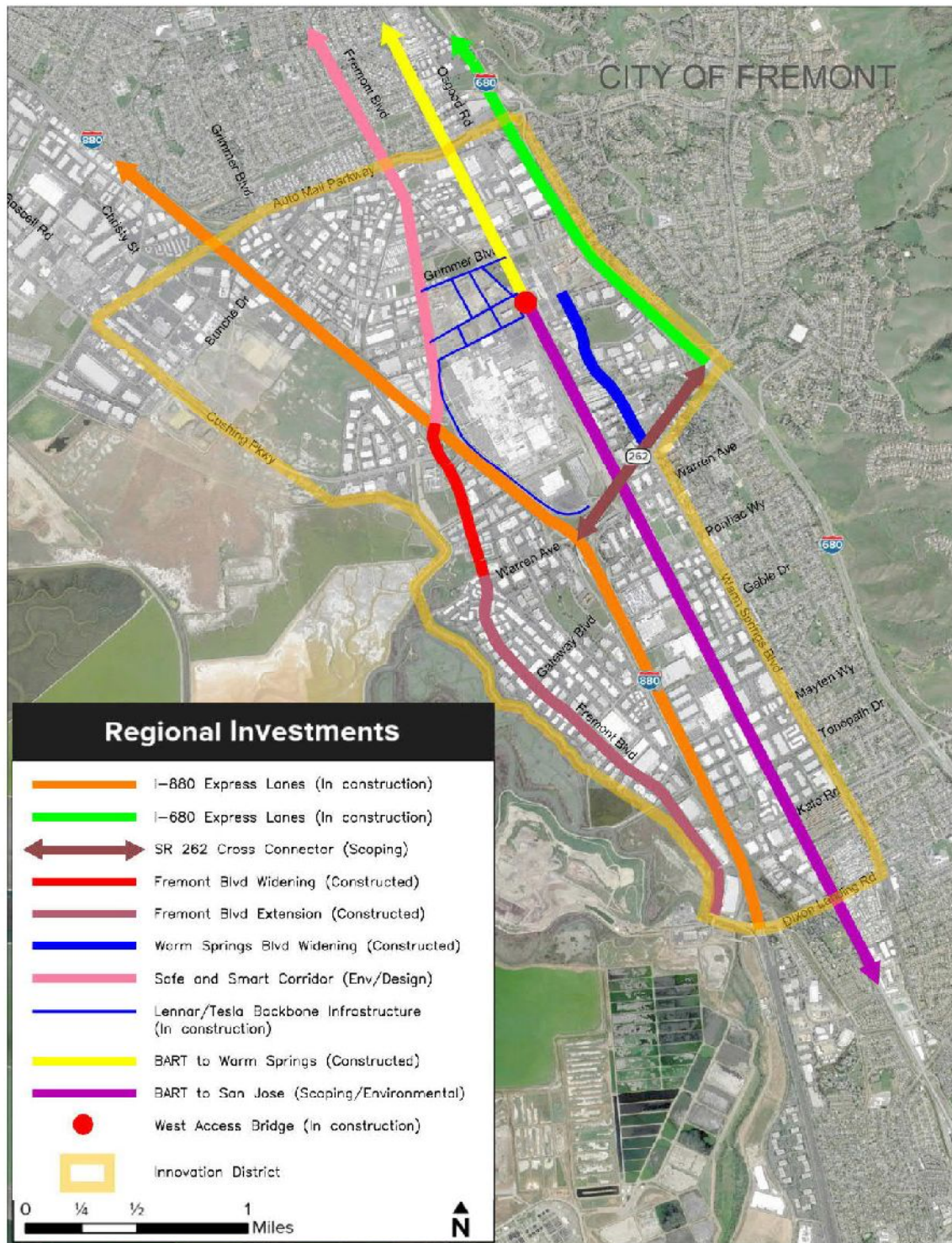


Figure 9: Regional Investments in the FID

CITY OF FREMONT BUILD GRANT APPLICATION

- A traffic signal modernization project, known as the **Safe and Smart Corridor Project on Fremont Boulevard**, extends to four (4) signals within the FID. **The project is fully funded with \$10 Million** from the Alameda County Transportation Commission (Alameda CTC) Measure BB sales tax measure.
- The **Warm Springs Bay Area Rapid Transit (BART) Station**, which began operations in 2017, connects the FID to the greater Bay Area and presents a viable opportunity to bring workers to job sites as shown in **Figure 10**.
- The anticipated **BART Silicon Valley extension into Berryessa/San Jose** will further enhance the vision of connectivity.
- The **West Side Access Bridge** is under construction and will provide pedestrian access between the Warm Springs BART Station and the rest of the FID.
- Portions of **Fremont Boulevard and Warm Springs Boulevard have been extended and widened** to improve safety and flow.
- **I-880 and I-680 Express Lane projects** are major regional transportation projects for Alameda County and nearby Contra Costa County to improve capacity by tolling these freeways. Both interstates are major commute and freight corridors.
- The **SR-262/Mission Boulevard Cross Connector project** proposes to improve operations and safety along and near SR-262, a major east-west connector between I-880 and I-680 within the City of Fremont.
- **Private investments in transportation infrastructure** include the Lennar Backbone Infrastructure, Tesla's Right-of-Way donation and privately installed traffic signaling and a privately-funded bikeshare program.



Figure 10: Warm Springs BART Station



Figure 11: Rendering of Innovation Way within the FID

CITY OF FREMONT BUILD GRANT APPLICATION

The next phase of the FID Mobility Program focuses on increasing transportation efficiency and safety for all transportation modes through traffic signal modernization of 37 traffic signals, which includes four (4) new signals constructed by private developers, located on major freight routes within the FID.

For the FY 2018 BUILD grant cycle, the City of Fremont requests federal funding for the **Fremont Innovation District Traffic Signal Modernization Project** within the larger Fremont Innovation District Mobility Program framework.

FREMONT INNOVATION DISTRICT TRAFFIC SIGNAL MODERNIZATION PROJECT

PROJECT DESCRIPTION

The **Fremont Innovation District (FID) Traffic Signal Modernization Project** is a priority project to enhance safety and efficiency of goods movement for the Tesla Motors factory and neighboring research, development and innovation companies. The project will deploy available technologies to improve the management of existing and future traffic conditions and



Figure 12: Rendering of Tesla Employee Access to the Warm Springs BART Station Within the FID

enhance safety for all users. **It will also create a corridor to pilot innovative technologies that advance the City of Fremont's Road to Zero Policy and Smart City Plan.**

The project forms the second phase of the City's overall citywide effort to upgrade traffic signals infrastructure within the City of Fremont. The first phase – the Safe and Smart Corridor project -- focuses on the arterial corridor of Fremont Boulevard with the highest crash fatality rate and provides access to the Fremont Innovation District from the north. **The City has secured \$10 Million in regional funding for the Safe and Smart Corridor project and**

environmental and design phase activities have commenced. The Safe and Smart Corridor project improves 34 traffic signals along Fremont Boulevard and will pilot, test and deploy innovative technologies that will easily translate to the FID Traffic Signal Modernization project, as shown in **Figure 13.**

CITY OF FREMONT BUILD GRANT APPLICATION

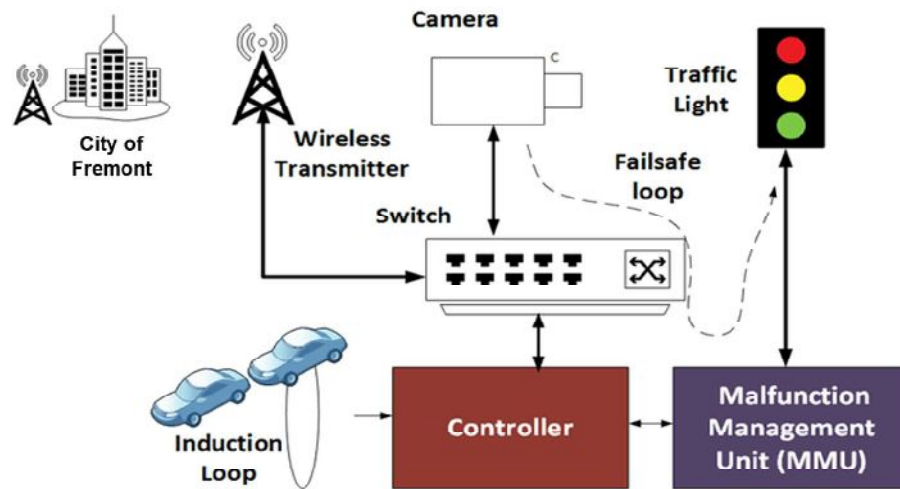


Figure 13: Technologies deployed in the Safe and Smart Corridor Project along Fremont Boulevard

The FID Signal Modernization Project is essential for the economic development and success of the Innovation District, given the high value goods movement activity present. As an example, Tesla utilizes a Just-in-Time (JIT) manufacturing strategy to minimize costs associated with the required inventory space and stockpiling of parts. Vehicle batteries, components, and parts are delivered by trucks from the Gigafactory in Sparks, Nevada, and warehouses in the Central Valley of California. These items arrive and are unloaded JIT for assembly and manufacturing in less than two (2) hours, with operations running 24 hours a day, seven days a week. As per Tesla's Master Plan, which includes the expansion of the manufacturing facility and increase in vehicle production, an estimated 2,000 commercial trucks per day are expected to travel to the Tesla factory. In comparison, the Port of Oakland, one of the top ten busiest container ports in the United States, serves about 3,000 trucks daily. **Anticipating an expected 4,000 daily truck trips at the Tesla factory and the surrounding roadways already at capacity, the City will need to use the existing infrastructure more efficiently and intelligently.**

To date, the project has received significant support from private partners in the form of both participation and funding. Out of all the signals within the FID that will undergo the modernization process, four (4) are funded by Tesla and one (1) by developers of the residential units.

PROJECT BENEFITS

- Supports growth and development of the FID.
- Reduces travel time, congestion and fuel consumption for goods movement.
- Reduces vehicle collisions and improves safety
- Increases freight throughput and performance.
- Enhances connectivity for commuters to easily get to and from work.

CITY OF FREMONT BUILD GRANT APPLICATION

PROJECT SCOPE

The project scope includes deploying the following traffic systems technology:

- Traffic signal modernization (controllers, traffic management system, asset/inventory management, et cetera).
- Adaptive traffic signal system technologies that adjust to real-time traffic conditions.
- Vehicle to infrastructure technology to support Just-in-Time manufacturing and goods movement.
- Advanced wireless back-haul communication, which allows information gathered from individual signals to be transferred to a wider system, allowing for integration of overall transportation networks real-time information.
- Optimal routing and signal timing for emergency response vehicles which accelerates response times.
- Sensor-rich environment to detect and distinguish vehicles with upgraded traffic signals.
- Automated speed monitoring and management system.
- Shared data portal.

3. PROJECT LOCATION

The FID is located in the southwestern part of the City and is bounded by Auto Mall Parkway to the north, Dixon Landing Road to the south, Warm Springs Boulevard/I-680 to the east, and Cushing Parkway/Baylands to the west. The I-880 and I-680 corridors pass through the FID in a north-south direction and are major interregional freight corridors. The SR-262 corridor provides east-west access through the District, handling significant regional traffic flows providing a critical connection from I-680 to I-880.

The FID currently contains 37 traffic signals. To accommodate the significant growth coming online in the District, an additional four (4) signals will be constructed by Lennar and Tesla through a Public Private Partnership, bringing the total number of signals in the District to 41. The FID Traffic Signal Modernization Project will apply advanced traffic signal upgrades and technologies to 37 traffic signals in the Innovation District; the

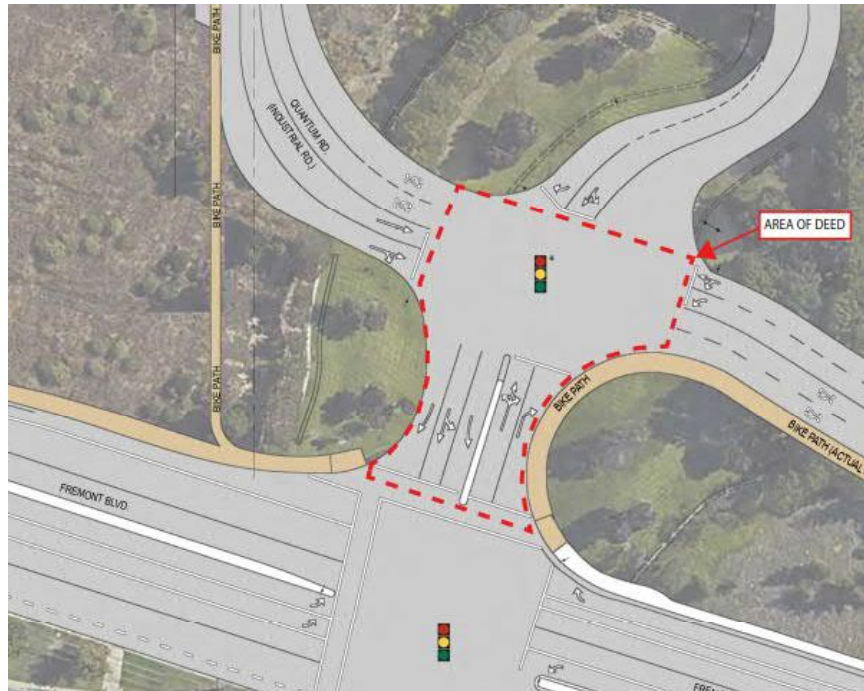


Figure 14: New Traffic Signal to be Synchronized with the Existing Fremont Blvd. Signal at the Tesla Facility

CITY OF FREMONT BUILD GRANT APPLICATION

remaining five (5) signals are already being upgraded as part of the first phase of the City's Traffic Signal Modernization Program.

Figure 15 shows the location of all traffic signals to be upgraded within the FID.

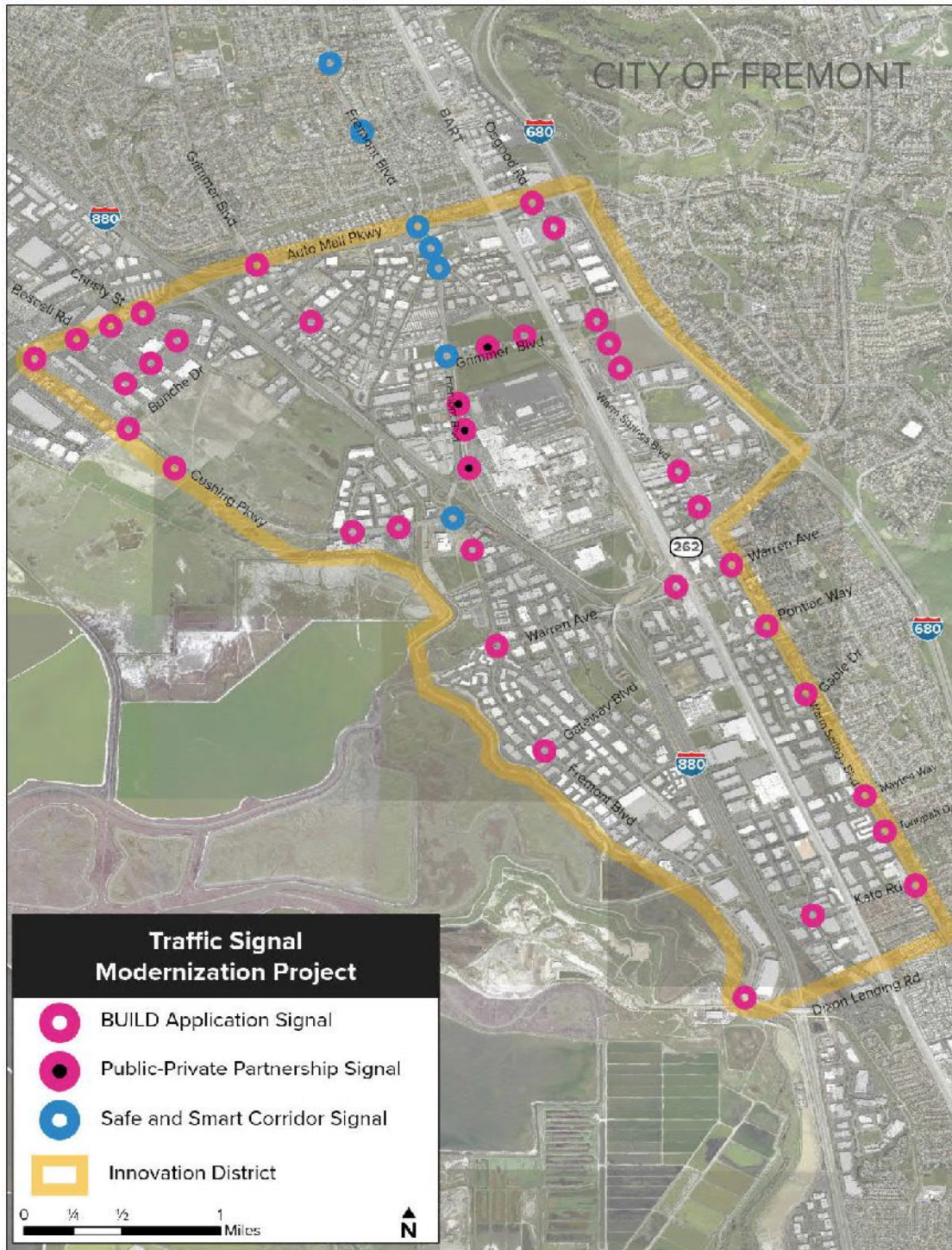


Figure 15: Fremont Innovation District Traffic Signal Modernization Project

CITY OF FREMONT BUILD GRANT APPLICATION

4. GRANT FUNDS, SOURCES, AND USE OF PROJECT FUNDS

EXISTING PROJECT FUNDS AND STATUS

The first phase of the Fremont Traffic Signal Modernization project – the Safe and Smart Corridor project along Fremont Boulevard is in the advanced stages of project development. This \$10 million phase is entirely funded by local Measure BB transportation sales tax funds. The project delivery process for the Safe and Smart Corridor project will mirror the project delivery for the FID Traffic Signal Modernization project since the scoping, procurement of technologies and implementation methodology and deployment are translatable to the subsequent phases of the citywide traffic signal modernization effort.

As the second phase of the citywide traffic signal modernization effort, the FID Traffic Signal Modernization project currently has **\$2.129 Million in local matching funds**

from the City of Fremont’s Capital Improvement Program (CIP), which specifically allocates funding for signal improvement projects within the city. The local matching fund covers all Preliminary Engineering (PE) and Plans, Specifications and Estimates (PS&E) activities.

Private investment for this project comes in the form of four (4) new traffic signals within the project scope being constructed and funded by Tesla and private developers. The estimated private investment is \$3,400,000. The City will install adaptive signaling equipment on the four (4) new traffic signals to connect them to the wider transportation network. This \$3.4 million commitment is conservatively not included in the project funding breakdown presented below, because design and construction of these new public-private partnership signals is already underway.



Figure 16: Lennar Master Plan Street Treatments

Table 1: Project Funding Breakdown

Funding Source	Funding Type	Amount	% of Total Project Cost
Capital Improvement Program	Local	\$2,129,350	25%
BUILD Grant	Federal	\$6,388,050	75%
Total Project Cost		\$8,517,400	100%

CITY OF FREMONT BUILD GRANT APPLICATION

AMOUNT OF FUNDING REQUESTED

The amount requested from the FY 2018 BUILD transportation discretionary grant for the FID Traffic Signal Modernization project is \$6.39 Million. As shown in Table 1 above, the total cost of the project is \$8.5 Million (including PE/PS&E) for the construction capital and support of the 37 traffic signals within the project area. **The federal share of the total project cost will be 75%, with 25% of local matching funds.** Table 2 summarizes project costs by phase.

Table 2: Project Cost Estimate

Item	Cost
1) Adaptive Signal Control	\$1,729,200
2) Emergency Vehicle Preemption	\$277,500
3) Automated Roadway User Detection	\$786,000
4) Signal Phasing and Timing (SPaT) Communication	\$2,035,000
Equipment Subtotal	\$4,827,700
Contingency (35%)	\$1,689,695
TOTAL CONSTRUCTION CAPITAL AND SUPPORT	\$6,517,400
PRELIMINARY ENGINEERING	\$500,000
PS&E/FINAL DESIGN	\$1,500,000
TOTAL PROJECT COST	\$8,517,400

The cost estimate includes upgrades to the 37 signals in the Fremont Innovation District area that are not already covered as part of the Safe and Smart Corridor project.

5. MERIT CRITERIA

a. Economic Competitiveness

BOLSTERS NATIONAL EXPORT COMPETITIVENESS

The FID is a nexus between technology and manufacturing -- supporting **national goals around increasing exports, on-shoring of jobs, and the production of American-made goods**. The FID's economic importance at the regional and national levels will only grow in time as its planned developments take shape.

CITY OF FREMONT BUILD GRANT APPLICATION

SUPPORTS SIGNIFICANT NEW LAND DEVELOPMENT

The planned development in the FID will introduce significant transportation demands on the existing infrastructure of the region. Specifically, **Tesla Motors's factory will be expanded from 5 million to 9.6 million square feet and supporting 10,000 jobs -- making it one of America's largest manufacturing facilities west of the Mississippi.** Plans for the Tesla expansion is showcased in **Figure 18.** The FID will see the development of new office, R&D, advanced manufacturing, and warehousing space totaling 4.2 million square feet. The new residential communities will introduce 4,000 new housing units, parks, a new elementary school, and neighborhood retail services. Additionally, new hotels providing 300 rooms and 53,000 square feet of meeting space to host conventions and industry events in the FID will provide support to prospective business tenants.



Figure 17: Building Typology - Mixed Use/Residential in the FID



Figure 18: Future Growth at Tesla

CITY OF FREMONT BUILD GRANT APPLICATION

FACILITATES EFFICIENT FREIGHT MOVEMENT

The FID roadway network handles significant freight movements, including trucks coming to and from Tesla and other advance manufacturing facilities. At the regional level, freight demand is projected to be on the rise according to the Countywide Goods Movement Plan released by the Alameda CTC in 2016. At the local level, Tesla's shipments will increase significantly as their expansion plan estimates a tenfold increase in production volumes.

Future Regional Freight Projection

Alameda CTC's Goods Movement Plan estimates the annual value of truck flow within the County to be worth \$140 Billion at 120 million tons. In 2020, the annual value in truck flow is expected to grow to \$280 Billion at 180 million tons.

As a result, critical improvements to the current transportation infrastructure must occur to accommodate a significant increase in demand. **The project will implement adaptive signaling systems to improve traffic flow, increasing the efficiency of freight movement, and reducing shipping costs through travel time savings.**

Research conducted by the Federal Highway Administration (FHWA) and the Transportation Research Board (TRB) for adaptive traffic control systems suggests that adaptive signal systems improve traffic flow in terms of less delay and more reliable travel times, with a travel time reduction of 10 percent on average.

INCREASED TRAVEL TIME RELIABILITY FOR FREIGHT AND COMMUTERS

Connected vehicle technologies, such as those included in the project scope, have the potential to further reduce travel delays by providing information to the traffic signal system and returning information to drivers to optimize approach speeds, acceleration and deceleration. This technology helps to reduce truck idling at checkpoints to get to and from the National Primary Freight Network routes in the area – I-680 and I-880. For example, Vehicle-to-Infrastructure (V2I)³ components could change local street signals to reroute trucks if there is a freeway incident, taking advantage of the multiple routes.



Figure 19: Idling Tesla Truck

³ Vehicle-to-Infrastructure— V2I communication is a critical component of a connected vehicle environment—a system of hardware, software, firmware and wireless communication that enables the dynamic transfer of data between vehicles as well as between vehicles and elements of the roadway infrastructure, FHWA.

CITY OF FREMONT BUILD GRANT APPLICATION

In addition to travel time savings, the planned adaptive control in the upgraded signals will improve travel time reliability, which is critical to JIT deliveries.

b. Safety

SAFETY BENEFITS FOR ALL MODES

The project area includes many accident-prone intersections within the region, as the business corridor is used by all modes. The City has been focused on preventing traffic collisions, especially that between vehicle and pedestrian or cyclists due to the high fatality rate of such accidents. In 2015, there was a collision at I-880 and Fremont overcrossing within the project area between a truck and a cyclist which resulted in one fatality. Adaptive traffic signal system technologies can improve traffic management by incorporating real-time local traffic condition information into the signal operations on a corridor. **Operational benefits are derived from the corridor's specific characteristics, and improvements can include optimized traffic flow for general traffic while providing safe-crossing opportunities for pedestrians and bicyclists.**

REDUCE SPEEDING— PRIMARY CAUSE FOR SERIOUS INJURIES AND FATALITIES

Improved traffic management will reduce speeding which is the primary cause for serious injuries and fatalities. This will be augmented with automated speed detection which provides warnings for exceeding the speed limit. In the Project Benefit Cost Analysis (BCA) produced by the City of San Jose regarding the “before” and “after” benefit analysis of a Traffic Signal Synchronization program implemented by the city, collision rates in the project corridor were

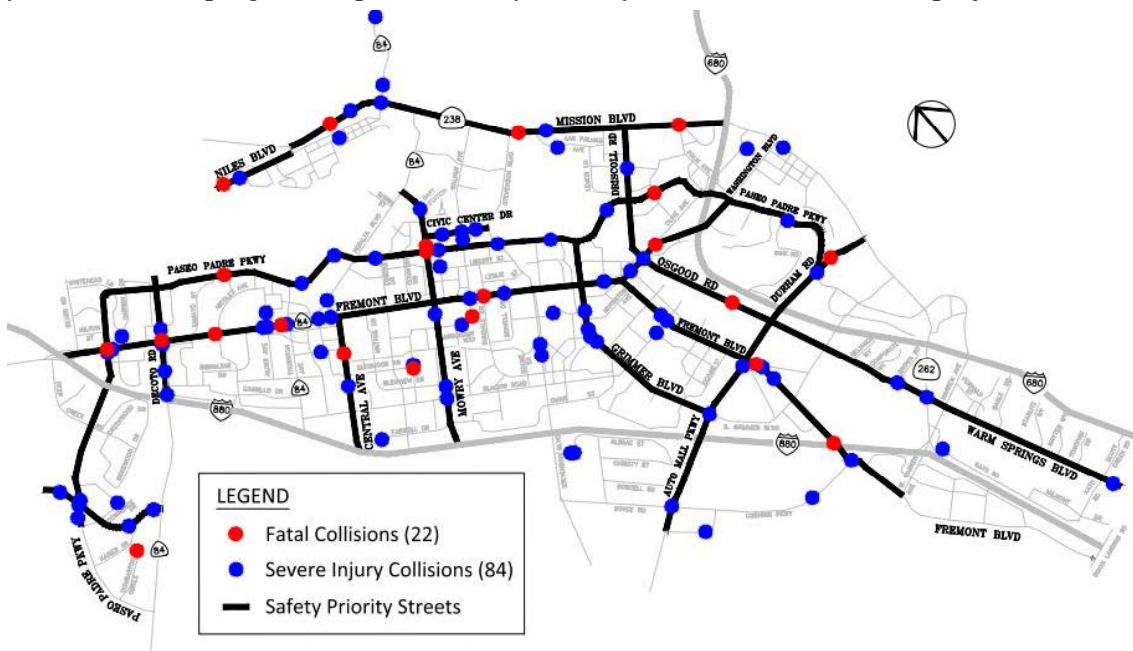


Figure 20: The City of Fremont Performs a Data-Driven Analysis as part of its Road to Safety Program (2013-2015 Data Illustrated Above)

CITY OF FREMONT BUILD GRANT APPLICATION

reduced by 16% over the course of three (3) years, even though the traffic increased by six (6%) during the time period of the analysis⁴.

REDUCE EMERGENCY RESPONSE TIME

Emergency Vehicle Preemption (EVP) is a key Intelligent Transportation Systems (ITS) feature to improve travel time and maintain emergency vehicle reliability in the corridor by efficiently providing priority signal treatments to emergency vehicles (e.g., extended green or early return to green). The proposed project system provides a wireless communications approach and allows emergency vehicles to activate signal preemption based on the estimated time of arrival to a given traffic signal.

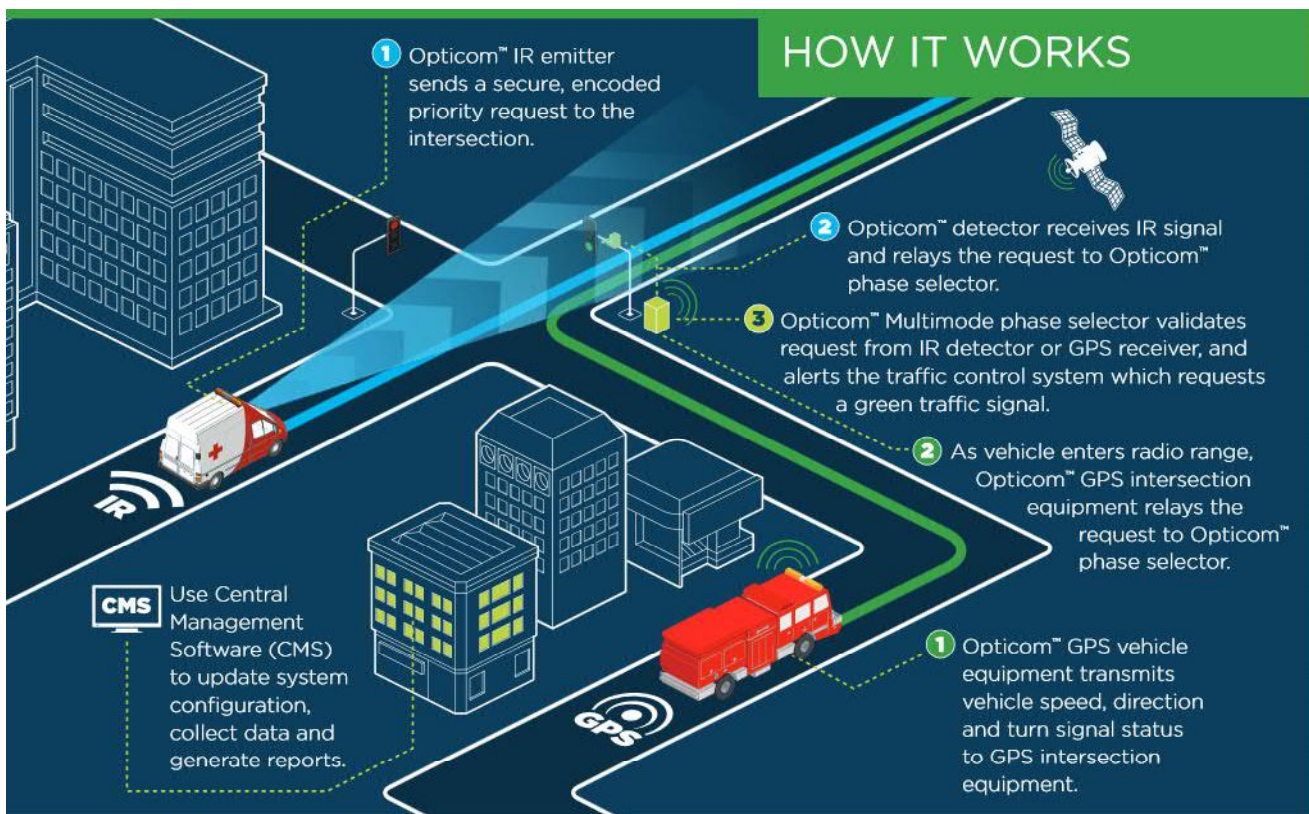


Figure 21: Emergency Vehicle Response Time Reduction Saving in Adaptive Signaling Projects

⁴ City of San Jose, 2010 Project Benefit Analysis Report

CITY OF FREMONT BUILD GRANT APPLICATION

REDUCED COLLISIONS FROM SMOOTHER TRAFFIC FLOW

Vehicle-to-Infrastructure components will communicate signal phasing/timing to vehicles and adaptive signal control will reduce stopping. These technologies and strategies will reduce some collision types, such as rear end collisions. Reducing collisions in the FID is particularly important, given the significant truck volumes and greater severity of truck-involved crashes.

Road to Zero

The City of Fremont has been a leader in the growing Road to Zero movement. The City adopted a Road to Zero traffic safety policy in 2015, and became the first mid-size City to adopt a Road to Zero Action Plan in 2016. Fremont has also been a leader in demonstrating how mid-size suburban communities can make strong commitments to improving traffic safety and eliminating severe and fatal collisions. Fremont's Road to Zero Action Plan focuses on safety benefits for both commercial and passenger vehicles. Fremont has seen a 27% reduction in severe and fatal collision in the first two (2) years since implementation of its Road to Zero policy.



c. Innovation

I. Innovative Technologies

STATE-OF-THE-ART ADAPTIVE TRAFFIC SIGNAL MODERNIZATION TECHNOLOGY

The Fremont Signal Modernization Project includes many innovative technologies in its scope. Many of the elements included in this project are identified in the mobility section of Fremont's Smart City Action Plan⁵. These elements will serve specific purposes related to safety, traffic management and reduced maintenance and energy consumption.

⁵ Think Fremont, Think Silicon Valley, <https://www.thinksiliconvalley.com/blog/fremonts-smart-city-action-plan-focuses-on-five-priority-areas>, Accessed July 2018

CITY OF FREMONT BUILD GRANT APPLICATION

In addition to the adaptive traffic signal control which has proven transportation benefits, the project includes several emerging technologies to further enhance the transportation system in Fremont and provide capabilities for further demonstration projects as technology evolves. For example, connected vehicle technologies using Dedicated Short-Range Communications (DSRC)⁶ are currently advancing through the research and testing phases and are expected to be available in automobiles in the near future. An initial application will be the communication of Signal Phasing and Timing (SPaT)⁷ information to drivers for better safety awareness at intersections.

Fremont Smart City Plan

The City of Fremont has been defining their own smart city agenda based on a series of cross-functional and collaborative discussions/workshops. The City started by looking at the existing efforts currently underway — smart traffic signals, EV-charging stations, the Pulse Point smart phone application, and roadway video surveillance.

The City conceptualized the projects they would like to engage in — everything from autonomous mobility on-demand to predictive disaster warning systems and open data initiatives.

These existing and future projects were categorized into five (5) buckets:

- Mobility
- Public Safety
- Energy and Environment
- City Operations
- Community Engagement

To date, the City of Fremont has established a vision and proposed values to guide their work. They have formed an Action Team to serve as both a catalyst for new ideas and a brain trust for moving important projects forward. An interactive matrix will track their progress and help prioritize projects based on multi-faceted criteria.

REAL TIME DATA ENVIRONMENT

Another emerging technology in the project is the use of automated bicycle and pedestrian detection. The sensors will be integrated with the adaptive signal system to adjust intersection clearance times and provide adequate crossing times for the safety of bicyclists and pedestrians.

The use of wireless communication traffic signal data to the traffic management center (TMC) -- rather than installing additional fiber optic cable -- and dynamic power management of street lights will provide new opportunities to reduce operations and maintenance costs. Integration of the various systems and the ability

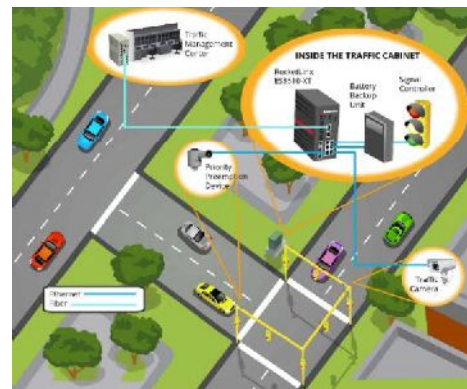


Figure 22: Real Time Traffic Data Management

⁶ DSRC (Dedicated Short-Range Communications) – a two-way short- to- medium-range wireless communications capability that permits very high data transmission critical in communications-based active safety applications, USDOT

⁷ Traffic signal control information that conveys the current movement state of each active phase in the system will provide the capability for Safety, Mobility and Environment, USDOT

CITY OF FREMONT BUILD GRANT APPLICATION

to share multimodal information with stakeholder agencies, the public and third-party technology developers will be a showcase for transportation technology in the region.

II. Innovative Financing

SUCCESSFUL PUBLIC-PRIVATE PARTNERSHIP

From its inception, the FID Traffic Signal Modernization project has successfully garnered private support, in the form of both participation and investment. As mentioned previously, existing tenants and developers within the FID have committed funding into the project, with four (4) of the 37 signals within the project scope to be funded and developed by Tesla and Lennar.



Figure 23: Public-Private Partnership for the FID Mobility Program

COMPREHENSIVE PRIVATE COMMITMENTS

In addition to traffic signals, tenants and developers of the FID have also invested in other aspects of the region's transportation infrastructure. For example, Lennar has developed a pedestrian trail on the edge of their development to the Warm Springs BART station and Tesla has donated land to extend the trail to their site. These investments enhance connectivity and circulation within the FID, strengthening the overall transportation infrastructure.

d. Partnership

A range of private and public entities are collaborating to plan, fund, and deliver the Fremont Innovation District Mobility Program:

- **Tesla** – multi-year partnership with City since 2010 selecting Fremont as the location of their advanced vehicle manufacturing facility. Partnership with the City has been key as they double the size of this facility. Tesla is contributing

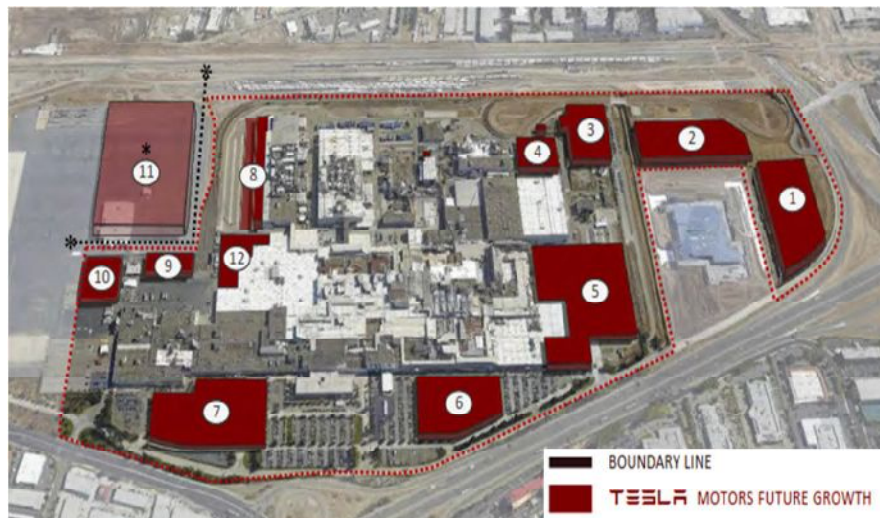


Figure 24: Future Growth per the Tesla Master Plan

many infrastructure improvements, including two (2) new signals to serve the growing

CITY OF FREMONT BUILD GRANT APPLICATION

volume of trucks coming to and from their plant, which will be included in the overall FID Traffic Signal Modernization effort.

- **Lennar** – developing 703,270 square feet of commercial and 2,214 housing units in the Fremont Innovation District. Contributing many infrastructure improvements, including two (2) new signals as part of an overall new roadway network within their development. These signals will be included in the overall FID Signal Modernization effort.



Figure 25: Developments within the Lennar Master Plan

- **California Department of Transportation (Caltrans)** – FID effort will include signals at I-680 and I-880 ramps as well as along SR-262 to serve significant volumes of trucks and commuters traveling to and from the FID.
- **Alameda County Transportation Commission (Alameda CTC)** – awarded the \$10 Million grant that is funding Phase 1 of the City’s Signal Modernization Program – Safe and Smart Corridor Project on Fremont Boulevard. The Alameda CTC administers the Measure BB Sales Tax, a local transportation sales tax which is a national best practice example of Self-Help transportation funding. They are also developing portions of the region’s expressway network and the SR-262 cross-connector project, which improves travel efficiency on nationally significant freight and commuter routes – a key component of the FID Mobility Program.

CITY OF FREMONT BUILD GRANT APPLICATION

- **Metropolitan Transportation Commission (MTC)** – developing and coordinating the region’s expressway network including express lanes on I-880 and I-680. It administers regional funding, including a recently approved bridge toll increase, enlarging the Region’s local transportation funding contribution.
- **Advanced Traffic Signal Connections⁸** - developing and testing technology to help the City deliver on its commitment to increase traffic signal efficiencies in the Fremont Innovation District which supports economic growth and local goods movement.

e. Environmental Protection

REDUCED ENERGY USE FROM VEHICLE IDLING

Both travel time and energy use reductions are anticipated due to reduced truck and commuter idling. A large portion of current and future users of the FID transportation network are heavy-duty freight trucks, with a higher energy intensity than light-duty passenger vehicles.⁹

SUPPORTS INDUSTRY LED EFFORTS TO REDUCE TRANSPORTATION ENERGY USE

Tesla is a nationally leading company in the development and manufacturing of low energy consuming vehicles. Tesla is making private innovations to improve transportation energy efficiency that can translate nationally and strengthen American manufacturing prowess.



Figure 26: Energy Conservation Principles Applied within the FID

f. Quality of Life

A BETTER TRANSPORTATION NETWORK FOR ALL

Travel time saved from more efficient traffic signals in the FID area will benefit all users of the regional transportation network. **First and foremost, the reduction in congestion and safety enhancements will translate to higher productivity for commuters who will be able to get to and from work easier.**

Figure 27: The FID Traffic Signal Modernization Project Will Improve Freight Movement and Improve Employee Productivity.



⁸ Consortium comprising of adaptive traffic signal system experts from University of California Berkeley, Massachusetts Institute of Technology, University of Southern California and City of Los Angeles

⁹ Bureau of Transportation Statistics, USDOT, 2018

CITY OF FREMONT BUILD GRANT APPLICATION

Other than commuters and freight truck drivers, residents who need to utilize the roadways for daily trips, such as school buses for the new elementary school within the FID, will be able to transport children to and from schools in a safer and more efficient manner.



Figure 28: Public Open Space Framework within the FID Mobility Program

SHORTER COMMUTE FOR EMPLOYEES

Currently, all traffic coming in and out of the Tesla manufacturing facility located in the FID passes through the entrance at Kato Road where two (2) new traffic signals are planned and will be funded by Tesla. Having an efficient way for employees to commute and managing traffic flow and parking demand are key challenges for businesses. The implementation of the FID traffic signal modernization project is expected to alleviate congestion for commuter traffic coming and going into the Tesla facility. A shorter and more reliable commute increases employees' productivity and drives economic growth for employers.



Figure 29: Tesla TDM Plan Implementation

VOLUNTARY PRIVATE TRIP REDUCTION COMMITMENTS

Tesla has made commitments parallel to the City's efforts on improving this problem. Tesla's TDM plan includes strategies to manage traffic flow in and out of its facilities, such as implementing carpool programs, employee shuttles and other alternatives to promote efficient movement of people. **The City of Fremont believes in working alongside private partners to improve transportation infrastructure for commuters, and the enhancement of the FID's existing and new traffic signals will help businesses become more competitive.**

CITY OF FREMONT BUILD GRANT APPLICATION

g. State of Good Repair

REDUCTION IN OPERATIONS AND MAINTENANCE SPENDING

The City expects that the FID Traffic Signal Modernization project will reduce operations and maintenance costs as well as assist the City in utilizing existing funding for targeted state of good repair projects. Out of the 37 signals within project scope, approximately half run on older systems which require upgrades. Installing newer equipment will enable the traffic signals to be controlled from a centralized facility or Traffic Management Center (TMC). This will enable automated data collection and analysis functions which are currently performed manually, as well as reducing the time spent by staff in addressing signal breakdown issues. **Currently, the City spends approximately \$500,000 a year on traffic signal maintenance. A newer system will decrease the operational costs significantly.**

In addition to a decrease in the City's operating costs through installing a newer system, the improved operation of the traffic signal system will further reduce resident complaints, reducing staff time and resources spent on processing these requests. Currently, the City receives approximately 200 complaints per year related to traffic signal delays and inquiries. The City expects that the implementation of the FID Traffic Signal Modernization Project will reduce the number of complaints, allowing staff time to be devoted to other areas deserving attention.

Fremont's Commitment to State of Good Repair

The City of Fremont has made significant increases in local funding to roadway preservation, including an annual allocation of \$2.2 Million from the General Fund and over \$4.2 Million from State gas tax and Alameda County Measure BB Sales Tax. These funds allowed approximately 50 miles of streets (approximately 10% of the City's roadway network) to be maintained last year. **The overall Pavement Condition Index (PCI) for Fremont streets is rated as "good" (PCI 73) and has improved steadily since 2012 when pavement conditions were rated as "fair" (PCI 63).**

h. Non-Federal Revenue for Transportation Infrastructure

MEASURE BB

In 2014, Alameda County voters approved Measure BB, authorizing an extension and augmentation of the existing transportation sale tax (Measure B). Measure BB is projected to generate approximately \$8 billion in revenues from April 2015 to March 2045 for transportation improvements for Alameda County.

6. PROJECT READINESS

TECHNICAL FEASIBILITY

The Project will build off of Phase 1 of the City's overall traffic signal modernization program. The Safe and Smart Corridor Project along Fremont Boulevard (Phase 1) is in advanced stages of project delivery, with preliminary design and environmental permitting underway. The FID Traffic Signal Modernization Project (Phase 2) will employ the same permitting process,

CITY OF FREMONT BUILD GRANT APPLICATION

technology, delivery model, and Basis of Design. It is anticipated that much of the preliminary work to enable Phase 1 will be translatable to Phase 2. By the time the FID Traffic Signal Modernization Project is ready for implementation, the City of Fremont will have gathered lessons learned from the delivery of the Safe and Smart Corridor Project on Fremont Boulevard, enhancing efficiency.



Figure 30: Lennar Development Under Construction Looking East Towards the Warm Springs BART Station

In addition, the FID Traffic Signal Modernization Project will leverage investments already being made in the centralized communication systems and backbone infrastructure as part of Phase 1.

Finally, since the project consists of upgrades to equipment within the existing right-of-way, it is anticipated to have a very low-level of risk associated with implementation and can advance quickly through project development milestones.

PROJECT SCHEDULE

Table 3: Fremont Traffic Signal Modernization Schedule

Project/Timeline	2017		2018				2019				2020				2021	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Safe and Smart Corridor (Phase 1)																
Project Development																
Installation																
Fremont Innovation District (Phase 2)																
PE/Environmental																
PS&E																
Obligate Funds																
Equipment Procurement																
Installation																

CITY OF FREMONT BUILD GRANT APPLICATION

REQUIRED APPROVALS

ENVIRONMENTAL PERMITS AND REVIEWS

The Preliminary Engineering/Environmental phase for the FID Traffic Signal Modernization project is expected to begin in Q1 2019. Around the same time, Phase 1's project development and final design will be close to complete. The environmental clearance will comply with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) and based on the City of Fremont's experience on the Safe and Smart Corridor Project on Fremont Boulevard, it is anticipated that the environmental permitting activities could be completed concurrently with preliminary engineering efforts. Both streams of efforts are scheduled to begin in Q1 2019 and be completed before Q3 2019.

According to CEQA requirements, the City has been in coordination with other agencies such as the California Department of Transportation (Caltrans) for state highway signal timing and Pacific Gas and Electric Company (PG&E) for utility and electrical infrastructure. The City expects the project to qualify for both Categorical Exemption (CEQA) and Categorical Exclusion (NEPA) during the Initial Review phase of the process.

PUBLIC ENGAGEMENT

Traffic congestion, especially related to goods movement in proximity to the major freight corridors of I-880 and I-680, is a major concern for the residents of the City of Fremont. Due to its geographical location, a majority of the traffic from the Central Valley and Tri-Valley area cuts through local streets within the City of Fremont. Congestion alleviation measures such as Traffic Signal System Upgrade and Modernization have been at the forefront of the City's planning efforts to help address these concerns. Local funding for traffic signal modernization projects are included in City's CIP and have been adopted by the City Council through a multi-stage public process.

FEDERAL TRANSPORTATION REQUIREMENTS

The FID Traffic Signal Modernization project adheres to the regional planning vision and goals through its inclusion in the regional planning process. It has been included in both the Regional Transportation Plan (RTP) and the Transportation Improvement Plan (TIP):

- RTP – Bay Area Forward project in Plan Bay Area 2040¹⁰
- TIP – Regional Arterial Operations & Signal Timing Program project in Bay Area 2017 TIP¹¹

ASSESSMENT OF PROJECT RISKS AND MITIGATION STRATEGIES

Overall, the project is assessed to be a low-risk project due to its scope and involves little to no addition or alteration to the current transportation infrastructure. The project will address the anticipated increase in travel demand and its goal to mitigate current and future congestion. **Table 4** summarizes potential project risks and mitigation strategies.

¹⁰ RTP ID 17-10-0033

¹¹ TIP ID REG090046

CITY OF FREMONT BUILD GRANT APPLICATION

Table 4: Project Risk Overview

Risk Type	Risk Level	Mitigation Strategy
Right-of-Way	None	No risk as project will be completed in existing City right-of-way.
Environmental	Very low	Project involves upgrades to existing signal equipment already deployed.
Community	Very low	Ongoing public engagement efforts through the City of Fremont Mobility Action Plan. The region supports efforts to improve freight movements, as shown by adoption of the Regional Freight Mobility Plan.
Cost Escalation	Low	Accounted for by adding contingencies of 30% in the project engineer's cost estimate to cover potential cost escalation.



Figure 31: Tesla Car Manufacturing Facility – Then and Now